

# UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 57501

CSAH NO. 22

OVER THE

RED LAKE RIVER

DISTRICT 2 - PENNINGTON COUNTY

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION  
BY  
COLLINS ENGINEERS, INC.  
JOB NO. 3512 (CEI 162)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 57501, Piers 1 and 2, were found to be in satisfactory to fair condition with undermining of the footing (base of shaft) and steel pile exposure at both piers. The concrete at the base of the piers below water was under reinforced and relatively soft with various spalls, cracks, and failed sections. The extent of the undermining and foundation pile exposure has been reduced at some locations since the previous inspection due to aggradation of the channel bottom material around the substructure units.

INSPECTION FINDINGS:

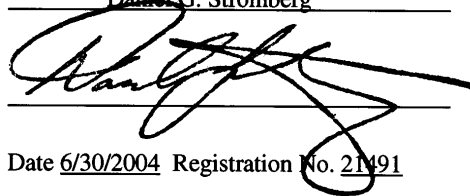
- (A) No design drawings were provided and it is assumed that the piers consist of a steel H-pile bent encased in concrete. The bottom of the encasement exhibited undermining, with maximums ranging from 9 inches at Pier 2 to 1 foot at Pier 1, exposing several lightly corroded steel H-piles at the upstream ends of the piers. There was 2 to 3 inches of the vertical face exposure of the footing (base of shaft) along the middle portion of the south sides of both piers and up to 9 inches of vertical face exposure at the downstream end of Pier 2.
- (B) A light to moderate accumulation of organics and/or timber debris was observed from the waterline to the channel bottom at the upstream end of Pier 1 and from 3 feet below the waterline to the channel bottom at the upstream end of Pier 2.
- (C) The concrete at the base of the pier shafts exhibited widespread irregularities due to section loss, with three corroded horizontal reinforcing bars exposed at the downstream end of Pier 1, as well as with cracks and areas of soft concrete at both piers.

RECOMMENDATIONS:

- (A) The extent of undermining and foundation pile exposure has been reduced since the last inspection, so based on this and the scour stable (low risk) rating for the bridge, future inspections need only particularly monitor the undermining and pile exposure.
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

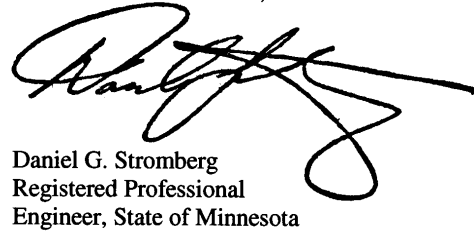
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

\_\_\_\_\_  
Daniel G. Stromberg

  
\_\_\_\_\_  
Date 6/30/2004 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.

  
Daniel G. Stromberg  
Registered Professional  
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 57501

Feature Crossed: The Red Lake River

Feature Carried: CSAH No. 22

Location: District 2 - Pennington County

Bridge Description: The bridge superstructure consists of three spans of multiple concrete box beams, which are supported by two concrete abutments and two concrete encased H-pile bent piers (assumed from field observations). The piers are numbered 1 and 2 starting from the south end of the bridge.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg  
State of Minnesota, P.E., No. 21491

Dive Team: Michelle D. Koerbel, Matt J. Lengyel

Date: August 26, 2002

Weather Conditions: Cloudy/Rainy, " 75E F

Underwater Visibility: " 2 feet

Waterway Velocity: " 2.5 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2.

General Shape: Field observations suggest that the piers are steel H-pile piers encased in a slender concrete shaft that steps out in a rectangular fashion at its base.

Maximum Water Depth at Substructure Inspected: Approximately 7.5 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier bridge seat on the west side of Pier 1.

Water Surface: The waterline was approximately 8.0 feet below reference.

Assumed Waterline Elevation = 92.0 feet.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 5

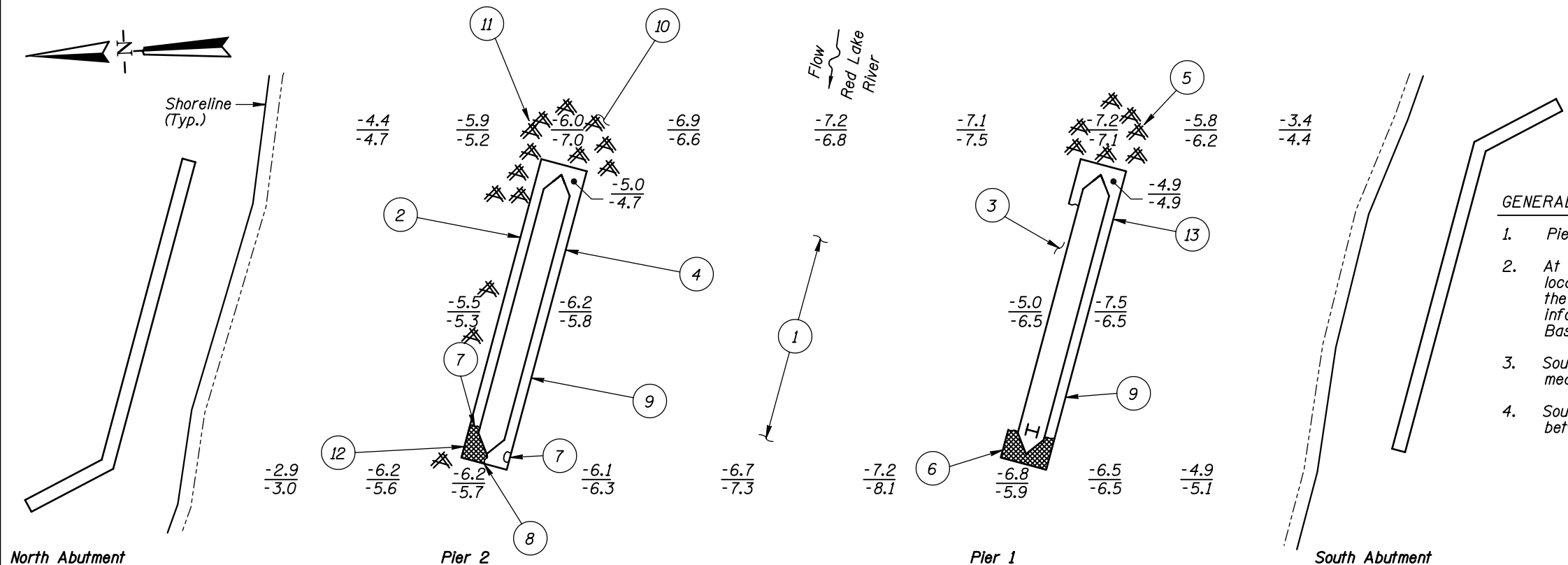
Item 61: Channel and Channel Protection: Code 5

Item 92B: Underwater Inspection: Code B/08/02

Item 113: Scour Critical Bridges: Code 1/94

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

\_\_\_\_\_ Yes   X   No



### SOUNDING PLAN

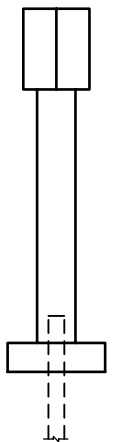
#### INSPECTION NOTES:

- The channel bottom material consisted of silty sand and gravel with scattered 6 to 8 inch diameter cobbles and up to 3 inches of probe rod penetration.
- The top of the enlarged bottom portion (stepout) of concrete shaft and up to 6 inches of the vertical face was exposed along the north side of the pier.
- Enlarged bottom portion of concrete shaft which was exposed during the previous inspection has since been covered with soft silty sand infilling with 1 foot of penetration along the north side of the pier.
- 9 inches of vertical undermining was observed at upstream nose and along 6 feet of the south side of the pier exposing several steel H-piles with light surface corrosion. The middle portion of the south side of the pier exhibited 2 to 3 inches of vertical undermining with typical probe rod penetrations of 6 inches and a maximum of 1 foot. The downstream end of the pier exhibited up to 9 inches of vertical step face exposure with no undermining.
- A light to moderate accumulation of vegetation and organics with 6 inch timber debris was observed from the waterline to the channel bottom and radiating 5 feet from the upstream nose of the pier.
- The bottom portion of the shaft (stepout) was broken off at the downstream end exposing three corroded horizontal steel reinforcing bars. The broken piece of the step was lying on the channel bottom and was approximately 3 feet long.
- A horizontal crack was observed along the top of the shaft step, 6 inches wide with 4 inches maximum penetration, extending from the shaft nose to edge of step.
- A spall was observed at the downstream end of the shaft step, 6 inches wide with 4 inches maximum penetration, extending from the shaft nose to the edge of the step.
- A spall was observed at the downstream end of the shaft step, 6 inches wide with 4 inches maximum penetration, extending from the shaft nose to the edge of the step.
- The concrete of the bottom portion of the shaft (stepout) was frequently soft on the surface with random irregularities and section losses having up to 5 inches of penetration.
- Riprap was observed on the channel bottom measuring 1 to 2 feet in diameter.
- A light to moderate accumulation of timber debris was observed around the upstream nose from 3 feet below the waterline to the channel bottom with branches up to 3 inches in diameter.
- The shaft bottom step was cracked and detached at the northern downstream end of the pier between the two noted cracks.
- 6 inches to 1 foot of vertical undermining was observed at the upstream nose and along 5 feet of the south side of the pier exposing several steel H-piles with light surface corrosion. The middle portion of the south side of the pier exhibited 2 to 3 inches of vertical undermining with typical probe rod penetrations of 6 inches and a maximum of 1 foot. The downstream end of the pier was level with the channel bottom with 3 inches of maximum vertical step face exposure along the downstream sides of the pier.

#### Legend

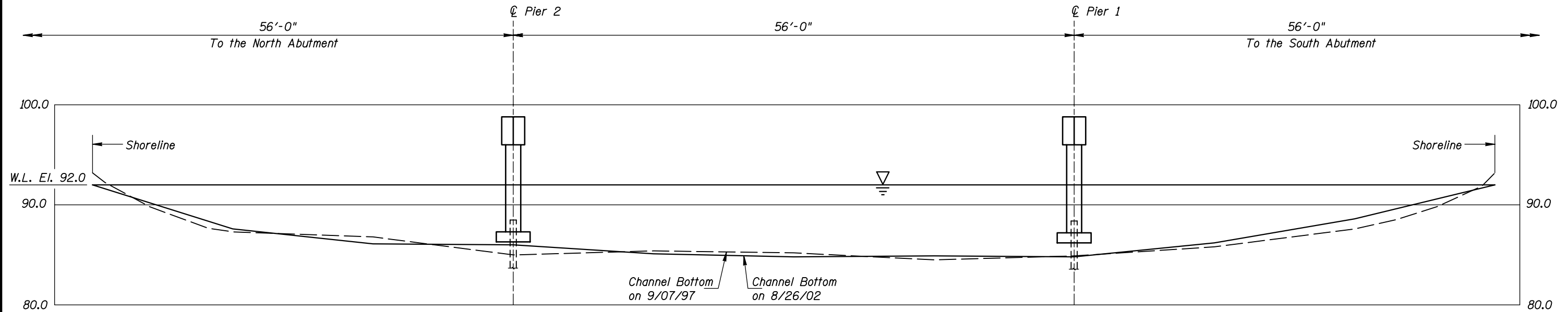
-2.0 Sounding Depth from Waterline (8/26/02)  
-5.2 Sounding Depth from Waterline (9/7/97)

X X X Timber Debris

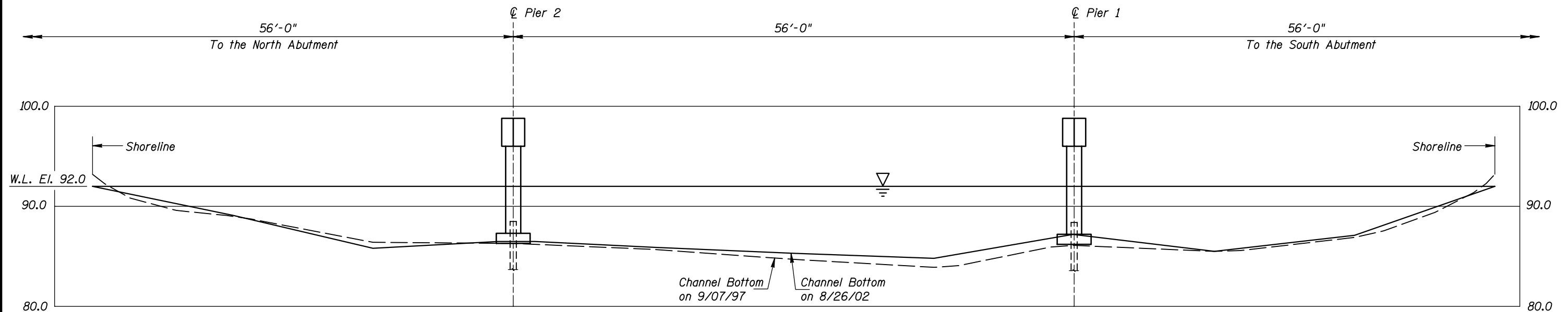


TYPICAL END VIEW OF PIER

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 57501 OVER THE RED LAKE RIVER DISTRICT 2, PENNINGTON COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: PRH	<b>COLLINS ENGINEERS, INC.</b> 300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Date: AUG. 2002
Checked By: MDK		Scale: NTS
Code: 35120162		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:  
Refer to Figure 1 for General Notes.

**MINNESOTA  
DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION**

STRUCTURE NO. 5750I  
OVER THE RED LAKE RIVER  
DISTRICT 2, PENNINGTON COUNTY  
**UPSTREAM AND DOWNSTREAM  
FASCIA PROFILES**

Drawn By: PRH  
Checked By: MDK  
Code: 35I20I62

**COLLINS ENGINEERS, INC.**  
300 W. WASHINGTON, STE. 600  
CHICAGO, ILLINOIS 60606  
(312) 704-9300

Date: AUG. 2002  
Scale: 1"=10'  
Figure No.: 2





Photograph 1. View of Pier 2, Looking Southwest.



Photograph 2. View of Pier 1, Looking Southwest.



MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES  
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc.

DATE: August 26, 2002

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E.

BRIDGE NO: 57501

WEATHER: Cloudy/Rainy, " 75E F

WATERWAY CROSSED: The Red Lake River

DIVING OPERATION:

☒

SCUBA

☐ SURFACE SUPPLIED AIR

☐ OTHER

PERSONNEL: Michelle D. Koerbel, Matt J. Lengyel

EQUIPMENT: Scuba, Probe Rod, Lead Line, Camera, U/W Light, Scraper, Sounding Pole,

TIME IN WATER: 5:15 p.m.

TIME OUT OF WATER: 6:00 p.m.

WATERWAY DATA: VELOCITY" 2.5 f.p.s.

VISIBILITY " 2feet

DEPTH 7.5 feet maximum at Pier 1

ELEMENTS INSPECTED: Piers 1 and 2

REMARKS: The submerged shaft concrete was in good condition, however as previously noted, the concrete at the base of the shaft exhibited widespread irregularities due to section loss, as well as cracks and areas of soft concrete. The concrete at the base of the shaft (stepout) continues to be undermined with some foundation pile exposure, however, the extent and height of the undermining has been reduced since the last inspection, with undermining only at the upstream ends and along the south side of each pier. Overall, there has been aggradation of the channel bottom material around both of the piers since the last inspection. There continues to be light to moderation accumulations of debris and timber drift at the upstream end of both piers.

FURTHER ACTION NEEDED: \_\_\_\_\_ YES ☒ NO

The extent of undermining and foundation pile exposure has been reduced since the last inspection, so based on this and the scour stable (low risk) rating for the bridge, future inspections need only particularly monitor the undermining and pile exposure.

Reinspect the submerged substructure units at the normal maximum recommended (NIBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 57501  
INSPECTORS Collins Engineers, Inc.  
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E. 21491  
WATERWAY CROSSED The Red Lake River

INSPECTION DATE August 26, 2002  
NOTE: USE ALL APPLICABLE CONDITION  
DEFINITIONS AS DEFINED IN THE MINNESOTA  
RECORDING AND CODING GUIDE INCLUDING  
GENERAL, SUBSTRUCTURE, CHANNEL AND  
PROTECTION, AND CULVERTS AND WALL  
DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE						CHANNEL					GENERAL					
			PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	7.5'	6	7	4	7	N	5	5	N	N	6	5	5	6	N	5	N	N
	Pier 2	6.2'	6	7	4	7	N	5	5	N	N	6	5	5	6	N	5	N	N

\*UNDERWATER PORTION ONLY

REMARKS: The submerged shaft concrete was in good condition, however as previously noted, the concrete at the base of the shaft exhibited widespread irregularities due to section loss, as well as cracks and areas of soft concrete. The concrete at the base of the shaft (stepout) continues to be undermined with some foundation pile exposure, however, the extent and height of the undermining has been reduced since the last inspection, with undermining only at the upstream ends and along the south side of each pier. Overall, there has been aggradation of the channel bottom material around both of the piers since the last inspection. There continues to be light to moderation accumulations of debris and timber drift at the upstream end of both piers.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.  
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.